Spring 2-1-2018

GPHY 486.01: Transport, Planning & GIS

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University of Montana, Missoula

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Co-requisite: GPHY 489:02 Cartography/GIS laboratory 1 cr,

- W 9-10.50 am (Geospatial Research and Teaching) Lab, Stone Hall 218.
- The lab will provide you with hands-on experiences and opportunities to start on assignments.
- However, you should be prepared to spend additional time outside of lab periods to complete lab assignments, and to additionally explore transport-related problems or GIS-T features on your own.
- Please note that some class periods will be used for lab activities – to make for a better ‘flow’ of the content.

Pre-requisites and target audience:
This course is designed for upper-division and graduate students.

- You should have an adequate quantitative background (M 115/Math 117 or higher) or you should be inclined to acquire it outside this course.
- Basic knowledge of Windows operations is assumed.
- GPHY 284 Introduction to GIS and Cartography is helpful, but not required.
- I am asking students with strong quantitative and cartography/GIS backgrounds to cooperate with others to promote success for all in this course.

Readings (overview):
- There is no textbook to purchase for this class.
Learning outcomes:
Students in this course will

1. Gain an understanding of networks (links and nodes) and their use GIS-T (here: TransCad)
2. will become aware of TransCad capabilities for routing and logistics, including access to services, and locating service facilities. We will put these tools to use to provide helpful analysis for the Montana Food Bank Network MFBN
3. advance their insight into the patterns and trends in urban passenger transportation,
4. develop an understanding of the principles of transport planning and travel demand modeling in GIS-T,
5. gain the ability to employ TransCad, the leading GIS-T software, to solve transportation and network problems, and run travel demand models,
6. and get to know street, socio-demographic and model-derived data for Missoula, which will be used (and added to) throughout the course.

Students will additionally
7. improve their skills in organizing files and managing databases,
8. and further their experience in synthesizing the findings of their model and presenting the findings visually, in speech and in writing.

Assessment:
Progress in this course will be promoted in a variety of ways, and assessed and graded as follows:

- **Attendance and participation** in class and lab (approximately 10 points).
- **Completion of a series of assignments** (approximately 60 points)
  - Early, basic lab assignments will introduce you to essential TransCad functions. Several assignments will introduce you to the routing and logistics features of TransCad, useful for determining service areas. (application: Montana Food Bank Network data)
  - Most assignments of the course form a sequence for building the 4-step travel demand model using Missoula data.
  - Please note that these assignments ‘build on each other’: to move forward, you must have completed the previous assignment. In essence, the assignments are cumulative. Additionally, they can form a considerable part (‘standard model’) of your final project.
  - I strongly encourage you to keep up with the work and avoid falling behind. To show your progress, you will submit selected output and/or short write-ups.
- **The final project** will consist of a
  - digital and oral presentation, and a concise (1800-2500 word) paper (please also note due drafts).
  - The intent of the final project is to employ the widely-used four-step transport model for Missoula and modify it above and beyond the lab assignments.
  - Examples of modifications: changes to the underlying transport network or to the land use system, changes in methods and parameter, or other modifications, such as pollution effects, bike routes, etc.
• 1-2 exams, or several short quizzes may be given, focusing on the conceptual understanding of course content (10 points)

✓ Throughout the course, you can work solo or in a team of 2 students.
✓ For teams: Lab assignments must show both names, but be submitted separately, even if identical in content (to better keep track of submitted work).
✓ Network and final project presentations may be made as a team, but the papers need to be separate papers.

Graduate Increment/s:
Graduate students
• will additionally write a 2500-4000 word paper which must contain: a properly formatted cover page, a table of content (Tip: use the ToC feature of your word processor), 1.5-2 line spaced text, a short bibliography/list of sources (Tip: use a bibliographic database manager such as the free on-line RefWorks, or similar. I use EndNote.)
• There are two options for the graduate increment paper: a literature review option and an applied methodology option.
  o For the literature review option, students will screen the professional literature for theoretical discussions and empirical findings on mode split (or another topic related to the course and of interest to you), or review an agency report or sections of a text.
  o Alternatively, the graduate increment can be have a methodological and applied focus by exploring a TransCad feature not dealt with (or only briefly discussed) in class.
    Suggested date for paper and presentation is April 6.
The final project of graduate students is expected to be more challenging and employ more sophisticated procedures than the projects of undergraduate students.

Grading:
Grades will be assigned using a +- system as follows:

<table>
<thead>
<tr>
<th>A</th>
<th>A-</th>
<th>B+</th>
<th>B</th>
<th>B-</th>
<th>C+</th>
<th>C</th>
<th>C-</th>
<th>D+</th>
<th>D</th>
<th>D-</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>93.3-</td>
<td>90-</td>
<td>86.7-</td>
<td>83.3-</td>
<td>80-</td>
<td>76.7-</td>
<td>73.3-</td>
<td>70-</td>
<td>66.7-</td>
<td>63.3-</td>
<td>60-</td>
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<tr>
<td>100</td>
<td>93.3</td>
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<td>73.3</td>
<td>70</td>
<td>66.7</td>
<td>63.3</td>
<td>60</td>
</tr>
</tbody>
</table>

Elements of the grade:
• Labs: approx. 60 points
• Final project drafts: 5 points (idea- 1pt; draft paper/outline – 2 points, draft digital presentation – 2 points)
• Final digital presentation: 6 points
• Final oral presentation: 8 points
• Final project paper: 10 points
• Attendance, participation: 10 points
• Exams/quizzes: TBD
• Bike-ped count: 1 bonus point per count, May 1 and May 5

Graduate increment:
• Digital presentation file: 4 points
• Oral presentation: 5 points
• Paper: 11 points
Assignments:
No late assignments:
- Given the complexity of the grading system, it would create a considerable burden to keep track of late lab assignments. Therefore, no late assignments. Please submit lab assignments on the due date.
- You can miss one lab assignment without a negative effect on your grade. However, no late assignments.
- Should we encounter an unforeseen and systematic technical problem that makes it difficult for the entire class to meet a deadline, a specific due date will be changed for all.
- Please communicate with me immediately if such technical difficulties should occur.

Submit assignments in Moodle Dropbox:
- Assignment will be submitted via Moodle dropboxes. The typical time for submission is 8 pm the Tuesday following the Wednesday lab (essentially 1 week) or equivalent if labs are assigned on a different day.
- Presentations will be submitted digitally before class of presentation date.
- Papers will be submitted in print and digital form when due.

Schedule:
At the end of this syllabus is a schedule of topics, including a list of readings and due dates.
- I have invited several guest speakers from the public, and the private sectors.
- As I will build some completely new labs (related to MFBN) into the course, some labs shown to be tentative, depending on the flow of the course.
- (However, we need to reach the Traffic Assignment stage as the final step of the Travel Demand Model.)
- Changes to the schedule may be made, and these changes will be announced in class.

Degree Requirements:
GPHY 486 Transport, Planning, and GIS relates to Geography degree requirements as follows for undergraduate students:
- BA/BS students pursuing a geography degree without option (BA/BS General Geography) can take this course as a Geography elective.
- BA students in the planning option (BA CEP) select GPHY 468/469 Community and Regional Analysis OR GPHY 486/489 Transport, Planning, and GIS (they can also take both)
- Students pursuing the GIS certificate, can use GPHY 486/486 as an elective (Vector GIS & Networks) or/and GPHY 468/468 (Data Management & Collection) to meet the 10-11 elective credit requirement.

for graduate students:
- MA/MS students without option (General Geography): GPHY 486/489 is an elective
- MS student in the planning option (MS CEP) are required to take GPHY 468/469 Community Analysis (GPHY 486/489 is elective)
- MS students in Cart/GIS option (MS Cart/GIS) either take GPHY 491/486w489 Transport Planning OR GPHY 468/469 (other may be elective)
- Graduate students who write a thesis involving transportation methods (or network models) can, with the approval of their advisor, take GPHY 486 to meet the methods requirement of the graduate degree. Please note that, in addition to travel demand modeling, GIS-T can be used in the social sciences to solve routing and logistics problems. GIS-T can be used in the natural sciences as well, i.e. for watershed models.
Software, Team Work, Planning, etc.:

- This is a hands-on, project-oriented course which benefits from team work.
- We will have access to 24 server licenses of TransCad (17 in Stone 218 and 7 in Stone 219. It is advisable to access the server licenses in sequence, not all at once.
- TransCad, a GIS-T (Transportation GIS) developed by the Caliper Corporation, is mainly designed for travel demand modeling as well as routing and logistics problems. The retail value is $10,000 per single commercial license, and $2000 per educational copy.
- On the Robinson2016 server is a folder containing the TransCad Demo software. It is fully functional but limited to pre-determined (canned) Caliper data. Additionally, it times out (after 60 minutes or so). You can copy that folder to your a memory stick for installation on your own computer.
- Caliper produced several video tutorials for Maptitude, a low-cost GIS with an interface similar to TransCad. [https://www.caliper.com/maptitude/mapting-software-video-tutorials.htm](https://www.caliper.com/maptitude/mapting-software-video-tutorials.htm)

- Additionally, keep in mind that TransCad is challenging to novice users. The version currently in use (TransCad 7) includes an ‘undo’ feature, which was requested by previous users. However, ‘undo’ places greater demands on a computer system and this may challenge networked computers in lab settings.
- (My experience: It really helps to close files after completing a step and re-opening for the next. If the software crashes, it helps to reboot the computer: shut it down completely and start new. It may be a good habit to do so before each lab session, especially once we start working with Missoula data.)

Course Materials and Communication via Moodle or Server:

Course Materials:

- In my lectures, I will use PowerPoint presentations. I plan to post the presentations either shortly before class or soon after class on Moodle. Posting on Moodle can be quite slow but I will do my best to give you access to course materials 24/7.
- I will also post this syllabus on Moodle.
- For Readings, please check the Server/Moodle.
- Instructions for assignments and geographic files needed will be on the Server. We are on our way to become ‘greener’ by using less paper and ink/toner. Please let me know in advance if you prefer a paper copy, in addition to the digital copy.

Communication:

- Besides access to course materials and assignments, Moodle offers easy communication between instructor and students.
- I will post announcements for the class, and also send e-mail. Moodle is set up to send e-mail to your official university e-mail address. If you do not regularly read your university e-mail, you could miss out on information.
- To avoid missing out on communications, I recommend that you develop the habit of using your university e-mail or to forward messages from your university e-mail to the account that you use. IT Central can help if needed.

Logistics: The Lab, LOGIN, the Server, File Locations, Printing, etc.:

Access to the GRT Lab (218 and 219):

- To access the labs 218 and 219 outside of the class period, please use your Griz Card on the card reader at Stone 219. I will contact our Administrative Associate to activate your Griz Card as a swipe card to access 219. Please let me know if you experience a problem. I will make every effort to keep the door between 218 and 219 open. Please help me with these efforts.
• The door from the hallway to 218 should be closed unless there is an instructor/class in the lab.

LOGIN:
To log on to computers,
• you need your NetID and Password. If you have a NetID as a student and as a UM employee, please use the student NetID,
• domain is Missoula.
• If you use other domains, ie CFC, permissions for you to access class materials on the server will likely not work.

The Server ROBINSON2016
• We will use the server Robinson2016, i.e. to access the Missoula street network data (provided by the Missoula Planners.)
• Using your NetID (with domain Missoula), you can get access to the server by ‘mapping’ to the server. I recommend to map to network drive T (T for transport). Please use GPHY486.

\Robinson2016\classes$ or \Robinson2016\classes$\GPHY486

Files on the Server: Read versus Write Access:
• Materials needed for lab assignments will be in a folder on the server.
• You can access (read) the data, but cannot write (save) to it.
• I created a student folder for each student with write privileges. Copy the lab folders (or the materials from the lab folders) to your own directory so you have write access.
• If you read the data from the ‘collective’ lab folder, others may be blocked from accessing it.
• When you open a geographic file in TransCad, make sure to ‘open for exclusive access.’

• Please note that TransCad is ‘path sensitive.’

Printing:
• With few exceptions, we will avoid printing.
• You can use UMoney on your GrizCard to print to the printer in Stone 219.
• Note that the printer charges for color if any amount of color is used in the document (ie color on a URL or email)!

Around the Labs:
Please Be Considerate of Others:
• Cell phones are disruptive to instructors and fellow students. If you carry a cell phone, please turn it off during the class period.
• It is equally disruptive to arrive late or walk into and out of the class room during the class period. Your cooperation is appreciated in keeping these disruptions to a minimum, unless there are health problems or other special circumstances.
• During the lab periods you may set a cell phone to a quite signal setting, which alerts you to a call without disrupting others. If you wish, you may step out during the lab period to respond to the call. Do not answer calls in the lab, please.

• If you come to Ston 218 during a period when another class is in session, communicate with the instructor (best in advance) whether it is OK to use an available station. Instructors may or may not give that privilege. Under no circumstance chat with others while another instructor’s class/lab is in session.

On Food and Beverages: No Food in lab 218 and near computers in 219.
• Please use the Geography lounge for snack breaks between classes.
• Beverages are only allowed in our computer labs if kept in closed containers.
• This is to protect the equipment and to keep both working and eating environments sanitary.

Health Habits:
• Let us also keep in mind that this is cold and flu season and that we are working in fairly close quarters. An outbreak of cold or flu would negatively impact this course.
• Please wash your hands thoroughly and frequently and use hand sanitizer. Thank you!

Additional Information:
Academic Honesty/Student Conduct:
• All students must practice academic honesty. Academic misconduct is subject to an academic penalty by the course instructor and/or disciplinary sanction by the University.

• All students need to be familiar with the Student Conduct Code. The Code is available for review online http://www.umt.edu/vpesa/Dean%20of%20Students/default.php or http://www.umt.edu/vpesa/documents/Student%20Conduct%20PDF-%20FINAL%208-27-13.pdf

Disability Accommodation:
• Students requesting disability accommodations are advised to contact the DSS office (406-243-2243), Lommasson Center 154.
• Please see http://www.umt.edu/dss/ or the corresponding pages of the Catalog.
• I will gladly accommodate students with disabilities. However, I need to be notified of that early on. It is not feasible to retro-actively accommodate students.
• I will seek to provide accessible documents as much as feasible.

Incompletes:
• Please see the Catalog pages for University policies on Incompletes. My recommendation: make every effort to avoid an Incomplete! If you have an emergency in the latter part of the semester, please communicate with me to discuss whether an Incomplete is an option for you.

Career Services:
• The Office of Career Services assists students in achieving career objectives. Please see the Career Services website for the range of services http://www.umt.edu/career/. Note, for instance, the Big Sky Career Fair in February http://www.umt.edu/career/about/career-fairs/big-sky-employment-fair/default.php.
Internships:
- A professional internship can be a useful addition to your formal education.
- Internship experience also adds to your resume.
- Furthermore, an internship can allow you to connect with a potential long-term employer.
- For the UM’s Enrichment-Internship Services, please consult the website http://www.umt.edu/internships.
- Internship opportunities, brought to the attention of current or ex-students or our faculty members, are also publicized via the Geography listserv.
- Previously, students had also good luck in locating and even opening up internship opportunities by directly contacting agencies and employers they would like to work for.
- Professional conduct is critical in assuring success with in arranging for and successfully completing internships.

Geography Listserv – Social Media:
- The Geography listserv allows you to gain and share information about up-coming departmental events (from group advising to parties); internship, preceptorship, and job opportunities; and other relevant information (graduation deadlines, course announcements, meeting announcements, etc.) The instructions below are from our website: http://hs.umt.edu/geography/resources/list-serv.php
- To join:
  o Send an e-mail to: GEOGRAPHY-subscribe-request@LISTS.UMT.EDU
    - This must be sent from the e-mail account that you wish to be on the Listserv
    - 2) Leave the subject line blank
    - 3) In the body of the e-mail type this:
      - subscribe your name Geography
  o You will receive an e-mail message confirming your subscription.
  o If you have any questions, please contact our Administrative Associate
- Please use the listserv judiciously. Keep in mind that the REPLY key will go to ALL listserv members, not only the person who sent a previous message.
- There is also a Geography Facebook page
- The Geography Club also has a Face book page to communicate about GeoClub events.

Final Exam Schedule
- The final exam schedule shows Tuesday, May 8 and Wednesday, May 9, 10.10-12.10 as exam periods for Gphy 486 and 489, respectively
### REGULAR FINAL EXAM SCHEDULE

<table>
<thead>
<tr>
<th>Hour on which class has met during the semester:</th>
<th>If the class meets daily, 4 times a week, or M, MWR, MWF, MF, MW, MTW, WF, TWF, MR, TW, TWR, WR, W, F or MT, the final exam will be held at this time:</th>
<th>If the class meets TR, T, R, MTR, RF, TRF, R, or TRS, the final exam will be held at this time:</th>
<th>Meeting date for the final exam:</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:00 am</td>
<td>10:10-12:10</td>
<td>8:00-10:00</td>
<td>Monday, May 7</td>
</tr>
<tr>
<td>9:00 am</td>
<td>10:10-12:10</td>
<td>8:00-10:00</td>
<td>Tuesday, May 8</td>
</tr>
<tr>
<td>10:00 am</td>
<td>10:10-12:10</td>
<td>8:00-10:00</td>
<td>Wednesday, May 9</td>
</tr>
<tr>
<td>11:00 am</td>
<td>10:10-12:10</td>
<td>8:00-10:00</td>
<td>Thursday, May 10</td>
</tr>
<tr>
<td>12:00 pm</td>
<td>10:10-12:10</td>
<td>8:00-10:00</td>
<td>Friday, May 11</td>
</tr>
<tr>
<td>2:00 pm</td>
<td>3:20-5:20</td>
<td>1:10-3:10</td>
<td>Monday, May 7</td>
</tr>
<tr>
<td>1:00 pm</td>
<td>3:20-5:20</td>
<td>1:10-3:10</td>
<td>Tuesday, May 8</td>
</tr>
<tr>
<td>4:00 pm</td>
<td>3:20-5:20</td>
<td>1:10-3:10</td>
<td>Wednesday, May 9</td>
</tr>
<tr>
<td>3:00 pm</td>
<td>3:20-5:20</td>
<td>1:10-3:10</td>
<td>Thursday, May 10</td>
</tr>
</tbody>
</table>

**Schedule and List of Readings**

- Please see below (screen snag)
- An EXCEL file showing the schedule and the readings is distributed in class and also on Moodle.
<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
<th>Topic</th>
<th>Readings</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>26-Jun</td>
<td>Pa 1</td>
<td>Introductory Inference; GIS vs. QGIS, pedagogical; teaching/tutoring</td>
<td>&quot;Teaching Statistics&quot;; &quot;GIS vs. QGIS&quot;</td>
<td>Lecture Tuesday, June 26, 7:30pm</td>
</tr>
<tr>
<td>26-Jun</td>
<td>Vo 2</td>
<td>LaK 5th Grade GIS: topic, 5th Grade GIS with ArcGIS; using GIS to analyze data</td>
<td>&quot;GIS in Education&quot;</td>
<td>Lecture Tuesday, June 26, 7:30pm</td>
</tr>
<tr>
<td>27-Jun</td>
<td>Fr 3</td>
<td>Transportation Analysis, Network Analysis, land use, regional &amp; urban</td>
<td>&quot;Transportation Network Analysis&quot;</td>
<td>Lecture Tuesday, June 27, 7:30pm</td>
</tr>
<tr>
<td>28-Jun</td>
<td>Fr 4</td>
<td>Graph Theory, multilevel models, estimation, estimation, statistical modeling</td>
<td>&quot;Graph Theory&quot;</td>
<td>Lecture Tuesday, June 28, 7:30pm</td>
</tr>
<tr>
<td>29-Jun</td>
<td>Fr 5</td>
<td>Geography Education; Geospatial, Geospatial, Geospatial Education</td>
<td>&quot;Geography Education&quot;</td>
<td>Lecture Tuesday, June 29, 7:30pm</td>
</tr>
<tr>
<td>1-Jul</td>
<td>Pa 6</td>
<td>LaK 6th Grade GIS: topic, 6th Grade GIS with ArcGIS, teaching/tutoring</td>
<td>&quot;GIS in Education&quot;</td>
<td>Lecture Tuesday, July 1, 7:30pm</td>
</tr>
<tr>
<td>2-Jul</td>
<td>Pa 7</td>
<td>LaK 6th Grade GIS: topic, 6th Grade GIS with ArcGIS, teaching/tutoring</td>
<td>&quot;GIS in Education&quot;</td>
<td>Lecture Tuesday, July 2, 7:30pm</td>
</tr>
<tr>
<td>3-Jul</td>
<td>Vo 8</td>
<td>LaK 5th Grade GIS: topic, 5th Grade GIS with ArcGIS, teaching/tutoring</td>
<td>&quot;GIS in Education&quot;</td>
<td>Lecture Tuesday, July 3, 7:30pm</td>
</tr>
<tr>
<td>4-Jul</td>
<td>Pa 9</td>
<td>LaK 6th Grade GIS: topic, 6th Grade GIS with ArcGIS, teaching/tutoring</td>
<td>&quot;GIS in Education&quot;</td>
<td>Lecture Tuesday, July 4, 7:30pm</td>
</tr>
<tr>
<td>5-Jul</td>
<td>Pa 10</td>
<td>LaK 5th Grade GIS: topic, 5th Grade GIS with ArcGIS, teaching/tutoring</td>
<td>&quot;GIS in Education&quot;</td>
<td>Lecture Tuesday, July 5, 7:30pm</td>
</tr>
<tr>
<td>6-Jul</td>
<td>Pa 11</td>
<td>LaK 6th Grade GIS: topic, 6th Grade GIS with ArcGIS, teaching/tutoring</td>
<td>&quot;GIS in Education&quot;</td>
<td>Lecture Tuesday, July 6, 7:30pm</td>
</tr>
<tr>
<td>7-Jul</td>
<td>Pa 12</td>
<td>LaK 7th Grade GIS: topic, 7th Grade GIS with ArcGIS, teaching/tutoring</td>
<td>&quot;GIS in Education&quot;</td>
<td>Lecture Tuesday, July 7, 7:30pm</td>
</tr>
</tbody>
</table>

**Readings**

- "Teaching Statistics"
- "GIS vs. QGIS"
- "Transportation Network Analysis"
- "Geography Education"
- "GIS in Education"